

# Mars Entry and Earth Return Re-Entry Drag Brake Decelerators, Phase I

Completed Technology Project (2018 - 2019)

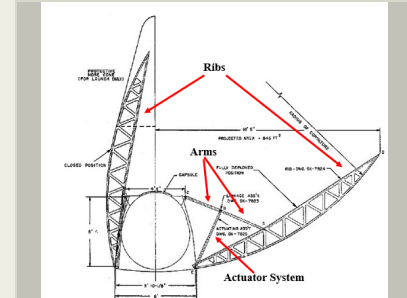


## Project Introduction

Blazetech Corporation is pleased to submit this Small Business Innovation Research (SBIR) proposal to the National Aeronautics and Space Administration (NASA) to develop an innovative decelerator concept with application to Mars Entry and Earth Return Entry (Earth-Mars Decelerator). The Earth-Mars Decelerator has its foundation with the Drag Brake concept as an alternative approach to safely returning astronauts from orbit. There are three important innovative features of the Drag Brake that distinguish its benefits. First, the use of a large umbrella-like shape forces vehicle slowdown at the higher atmospheric altitudes essentially reducing the heating rate so much that it eliminates the need for a heavy thermal protection system. Second, the ability to modulate the lift and drag behavior by reorienting the drag brake at the lower altitudes permits more precise landing locations and slower landing speeds. Third, carbon-based material choices and structural designs (as opposed to stainless steel materials) provide lighter and stronger decelerators with appropriate surface emissivity and anti-oxidative coatings. In addition to these three features, the new Drag Brake concept also has the following additional beneficial characteristics. Flexible Decelerator has never demonstrated in re-entry flight. This is a unique program goal. Blunt shape aerodynamically stable through entire re-entry flight regime. The technical approach accommodates secondary deceleration (inflatables, parachutes), if necessary.

## Anticipated Benefits

- \*Decelerator for Mars entry
- \*Decelerator for Earth return re-entry
- \*Earth re-entry decelerators from moon orbital and landing missions
- \*Mars gentle entry decelerators of sensors, probe vehicles and personnel
- \*Venus entry decelerators
- \*Safety "lifeboat" decelerator from the International Space Station (ISS)
- \*Rescue decelerators for recreational space flight missions
- \*Decelerators placing sensors in remote earth locations
- \*Decelerators delivering foldable, erectable unmanned aircraft safely to low altitudes from low Earth orbit (LEO)
- \*Decelerators delivering personnel worldwide in two hours from LEO



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## Table of Contents

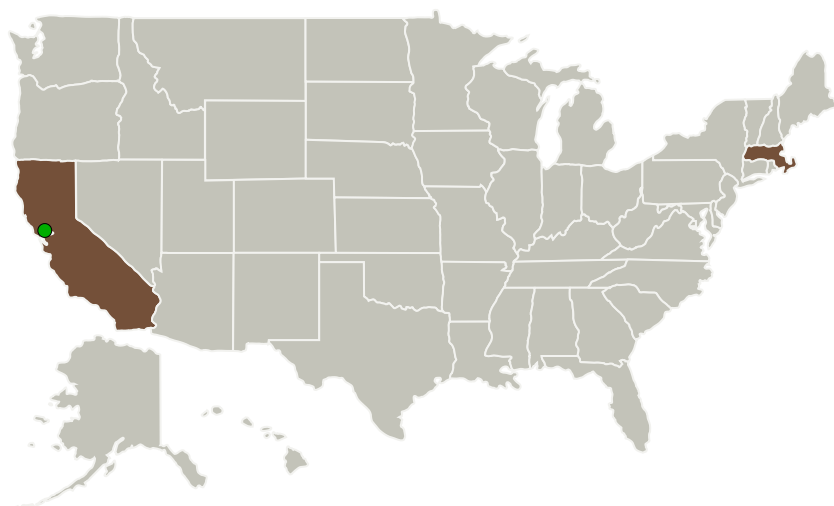
Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	2
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Technology Areas	3
Target Destinations	3

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Blazetech Corporation	Lead Organization	Industry	Woburn, Massachusetts
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Massachusetts

## Project Transitions

**July 2018:** Project Start

**February 2019:** Closed out

**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/137860>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Blazetech Corporation

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

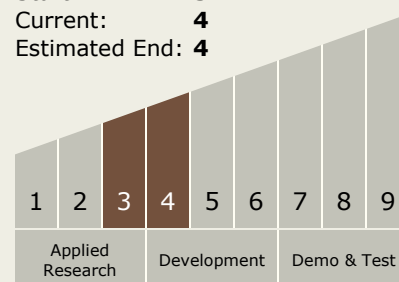
Carlos Torrez

**Principal Investigator:**

Hartmut Legner

## Technology Maturity (TRL)

Start: **3**  
 Current: **4**  
 Estimated End: **4**

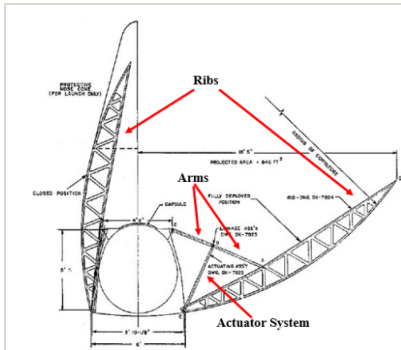


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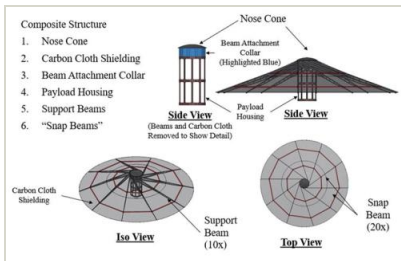
## Images



### Briefing Chart Image

Mars Entry and Earth Return Re-Entry Drag Brake Decelerators, Phase I

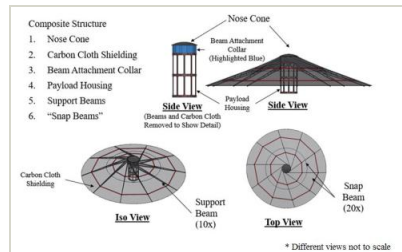
(<https://techport.nasa.gov/image/135092>)



### Final Summary Chart Image

Mars Entry and Earth Return Re-Entry Drag Brake Decelerators, Phase I

(<https://techport.nasa.gov/image/126067>)



### Final Summary Chart Image

Mars Entry and Earth Return Re-Entry Drag Brake Decelerators, Phase I

(<https://techport.nasa.gov/image/136254>)

## Technology Areas

### Primary:

- TX09 Entry, Descent, and Landing
  - └ TX09.2 Descent
    - └ TX09.2.1 Aerodynamic Decelerators

## Target Destinations

Earth, Mars